POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

"Tells you how to do things." Written so you can understand it.

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Rope Bridge Moored to Mountain Peaks

FRAIL BRIDGE IN COUNTY ANTRIM, IRELAND, 300 FEET ABOVE A TORRENT

IN THIS ISSUE:

Unique Suspension Bridge in Ireland.
When the Bottom of the Sea Gives Way.
Only One Bakery in Turkey Uses Machines.
Traveling Electric Lamps.
Machine That Lays Track Without Stopping.
Search for a Substitute for Coal.
Sailing Vehicles on Land.
Ice for London Comes from Norway.
Small Cold Storage Plant for Farmers.
Easy Electrical Experiments:—Making a Storage Battery, Part II.
Shop Notes:—Home Made Foot Power Hammer—Babbitting Band Resaw Boxes—Calking Boilers—Origin of Nail Terms—To Drill Chilled Cast Iron—Steam Hammer That Weighs 176 Tons—Origin of Horse-Power Unit—Enormous Force of Explosives—Sewing Machine Drawing Table.
Electric Watch to Run 15 Years.

Popular Mechanics can be bought of any newsdealer in the United States.

ROPE BRIDGE MOORED TO MOUNTAIN PEAKS.

Spans a Chasm in the Clouds While Torrents Rage Three Hundred Feet Below.

Swung between two mountain peaks, three hundred feet above a torrent rushing into the sea below, is a narrow rope bridge which affords the only means of transit between a salmon fishery and the town of Old Bushmills, in County Antrim, Ireland. In Old Bushmills there is a distillery and often the fishermen climb the steep mountain's sides, cross this web-like span and descend into the valley beyond to get a drink of whisky. It would seem that a person would have to be exceedingly thirsty to even cross this bridge for a drink, but when it comes to climbing three hundred feet up a mountain's side and down and up and down again to appease the desire there must exist a thirst the enormity of which none but a County Antrim Irishman can appreciate. But the whisky is said to be exceedingly fine in this old distillery and none of the fishermen ever begrudges the exertion. The man who makes the trip, however, always brings back a jug full of the beverage for his associates, who usually pay for it by each subscribing a certain small amount. One jug usually lasts the gang a day and the man who goes for it does not have to contribute and in addition is allowed the price of a drink at the distillery. The bridge is shown in the front page illustration.

J. Marshall Weir, of Chicago, who is familiar with every rock on this mountainous coast of Ireland, says: "While the little rope bridge looks to be exceedingly frail, it is in reality very substantial. It is made of cross-boards, 3 feet long, sewed together by ropes, the ends of which are firmly moored on either side. The only danger is of a person's being blown off when the winds are high. The water in the background is the Atlantic ocean off the Northern coast of Ireland. The towering walls of rock here rise almost perpendicularly from the water's edge, and often the waves that lash the granite shore hurl their spray into the faces of persons standing on the bridge. When the wind is from the sea the little span is constantly in the path of a gale that sweeps furiously through this small canyon in the mountains. Besides the fishermen, adventurous tourists and mountain climbers often scale the height and cross from mountain to mountain on this swinging walk. Here lovers of the adventurous may get their fill of thrilling sensations, as the tiny bridge, swayed by the wind, rocks to and fro above the yawning abyss. Many of the more timid have turned back rather than dare the danger.

"The bridge is 60 miles from Belfast on the road to the Giant's Causeway. It is taken up in the winter when the fisheries are abandoned."

PLATINUM IN CALIFORNIA.

Platinum, the heaviest and one of the most expensive of metals, indispensable in many forms of electrical apparatus, has been discovered along the Trinity river, in California. Prof. J. F. Kemp, of the United States Geological Survey, says that the platinum is very sparsely distributed in its mother rock, but he holds out a hope of its yet being found in quantities sufficient to mine. He thinks that large and permanent placers are to be looked for only in very old land areas which have been subjected to protracted degradation and concentration, says Western Electrician; that in the assay of antimonial, arsenical and other copper ores, but especially of gray copper (tetrahedrite), it is worth while to look for small percentages of platinum, and that deposits of chromite deserve similar testing for platinum.

At present nearly all our commercial platinum comes from Russia, where it is found in gravel in the placers, both in the beds of streams and above water level. Colombia ranks second as a producer of the valuable metal.

WHEN THE BOTTOM OF THE SEA GIVES WAY.

It Will Be Caused by Volcanoes, Says M. Rabourdin, and the Earth Will Become a Globe of Fire.

When the bottom of the sea gives way from some future volcanic disturbance the whole earth will be consumed in flames, just as other worlds every day are being consumed, according to Louis Rabourdin, the French scientist. The recent volcanic disturbances lead this scientist to believe that such a time is not far distant. The earth's crust is very thin at the bottom of the sea, he says, and adds that the floor on which we stand is more frail than we are led to believe. The Literary Digest says:

"M. Rabourdin imagines a disaster so great as to involve the whole earth. If such an event should occur he thinks that from a distant world its appearance and progress would exactly parallel what we ourselves see in the case of the "Novae," or distant stars that blaze out in the heavens from time to time."

In the Cosmos, of Paris, M. Rabourdin says: "Suppose that following upon an extraordinary twisting movement, due to retreat of the central mass, a whole portion of the sea bottom should give way, and falling suddenly, should let in the mass of the ocean's waters upon the incandescent interior matter? The water would be decomposed by the heat, the hydrogen would burn, and it would burn more as it had access to more oxygen. The conflagration would thus gain gradually in force, accompanied by electric phenomena, and the greater part of the earth's crust would probably be displaced. The earth, passing through a critical epoch and returning for the time being to its formative period, would again be nothing but a globe of fire.

"For the far-off worlds that swing in sidereal space, this would be the phenomenon of a new star that blazes out all at once, increases in brilliancy as if it would eclipse the luminous splendor of all its neighbors, and then becomes feebler and feebler, to disappear finally forever in the profound darkness of the limitless distance."

"POPULAR MECHANICS HAS A GREAT FIELD."

The Book and Newsdealer, the most influential exponent of the retail dealer, says in its September issue: "There will be found no more salable magazine anywhere than the me parts of Popular Mechanics, and that dealer is a bit behind the times who does not keep copies on sale—and they never grow old, which is true of very few periodicals. The first cover page now appears with illustration, and the effect is for the bet In the current number are 259 articles and 115 illustrations—a total few periodicals can reach at any price. Popular Me has a great field, and occupies it alone unquestioned as to right or supremacy. The monthly number retails for a dime, and may be had on sale through the News Company, same as the weekly issues."

SOLARI EXONERATES MARCONI.

"It is utterly untrue that Marconi has acknowledged that I am inventor of his wireless telegraph system or that the accessory invented by me which, by the desire of the Italian government, was provisionally protected in Marconi's name, is necessary or important for his system. I make no such claim. It is merely accessory." Marquis Solari.

The marquis makes the above statement to show that he lays no claim to the Marconi invention, or that Sig. Marconi has yielded credit for his invention to Solari.

Popular Mechanics desires one live representative in each shop in the United States. Many of our representatives are clearing five dollars a week without interfering with their work, by introducing the paper during the noon hour.

TRAIN LAYS ITS OWN TRACK AS IT MOVES.

Novel Engine That Builds a Railroad Without Stopping Is a Mechanical Marvel.

To tell of a train laying its own track ahead of it as the train moves along without stopping would have been considered a fairy story in times past, but it is an actual realization of today. Such a feat is made possible by what is known as the Hurley track-laying machine, the invention of R. E. Hurley, of Scranton, Pa. The train of ties and rails is pulled by a machine car, instead of a locomotive, and this machine car, equipped with a boiler and two reversible stationary engines of 100 h. p., also performs the work of laying the track. After the roadbed is completed the "track-laying train" is started out. When it gets to the end of the line it leaves a railroad behind. The device has been used in the construction of track on the Bessemer & Lake Erie railroad, and even in this day is looked on as a kind of marvel.

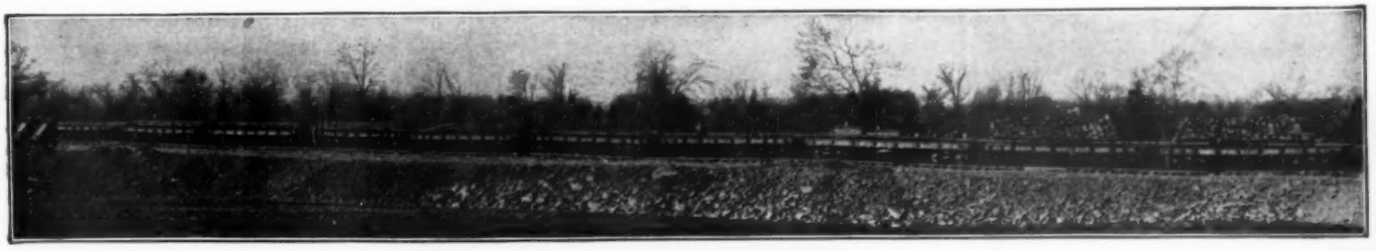


Fig. 1.—Ties Moving Forward Over the Train.

A continuous line of rails is laid along on top of the train of flat cars to the rear of the machine car. On these the ties are kept moving toward the front by means of steam-driven friction rolls. As the rails move forward they convey all the ties necessary to lay them. Fig. 1 and Fig 3 show the rails and ties as they appear when moving forward over the train. As the ties arrive at the machine car they are caught on an endless chain and conveyed up an incline over the top chords of the cantilever extension and allowed to slide down an incline and fall upon the roadbed crosswise the alignment of track (Fig. 2). They fall nearly in place, and two men can easily keep them arranged as they are slid down the incline. Attached to the bottom chord of each truss there is a channel, in which are power rollers for moving the rails forward. A rail on each side is sent forward under the overhang, grasped by a pair of tongs and lowered by one man onto the ties that have already been laid. The Railway Review, in a lengthy description of the remarkable device says:

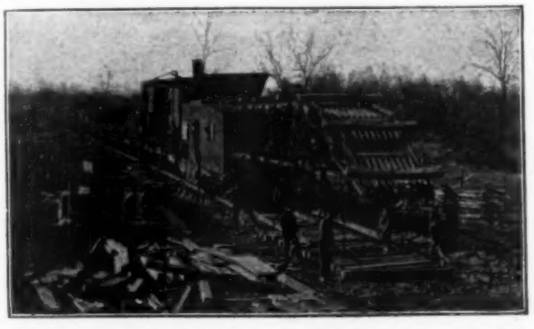


Fig. 2.—View of Front End of Hurley Track-Laying Machine.

"The train moves gradually forward at the rate of 20 to 30 feet a minute, and with experienced track-layers it is not necessary to stop. The machinery is so geared that the material is moved forward over the cars at exactly the same speed that the train moves over the track."

SEARCH FOR SUBSTITUTE FOR COAL.

Present High Price Puts the Inventors to Work, and Many Patents Result.

A substitute for coal as fuel will probably result from the miners' strike and the present high price charged by the coal dealers. Since the strike began to assume such serious proportions, and since the price of coal has gone soaring, the patent office has been deluged with applications for patents on every conceivable kind of invention that might do away with or lessen the use of coal. Up to date there have been granted 1,280 patents for the use of oil as fuel, and 2,700 for the use of gas and vapors. Many of the devices are meritorious, and out of this deluge of inventions it is probable that a practical contrivance will be found that will make the manufacturer and the public independent of the coal trust. A considerable number of the inventions are for crude oil burners for household purposes, locomotives, steamboats and manufacturing plants. There are two main lines of invention to be utilized for these purposes which have been patented for many years. One is for supplying the oil mixed with steam for combustion, and the other is for turning it into vapor and burning it in that form. These two plans for utilizing oil for fuel are at the base of the multitude of inventions that are recorded in the patent office and that are coming in there daily.

The main ideas regarding the burning of oil for fuel were worked out fifteen years ago, and an attempt was made to put them in operation. The New York Central Railroad tried the experiment, but practical difficulties were encountered, and they gave it up. Oil cost them about $1.25 a barrel, and coal was not then as dear as it is now. Oil of Texas is being produced in enormous quantities at 20 cents a barrel, and coal having been greatly increased in price, the whole problem is now placed on another basis, and inventors are working energetically to devise some practical plan.

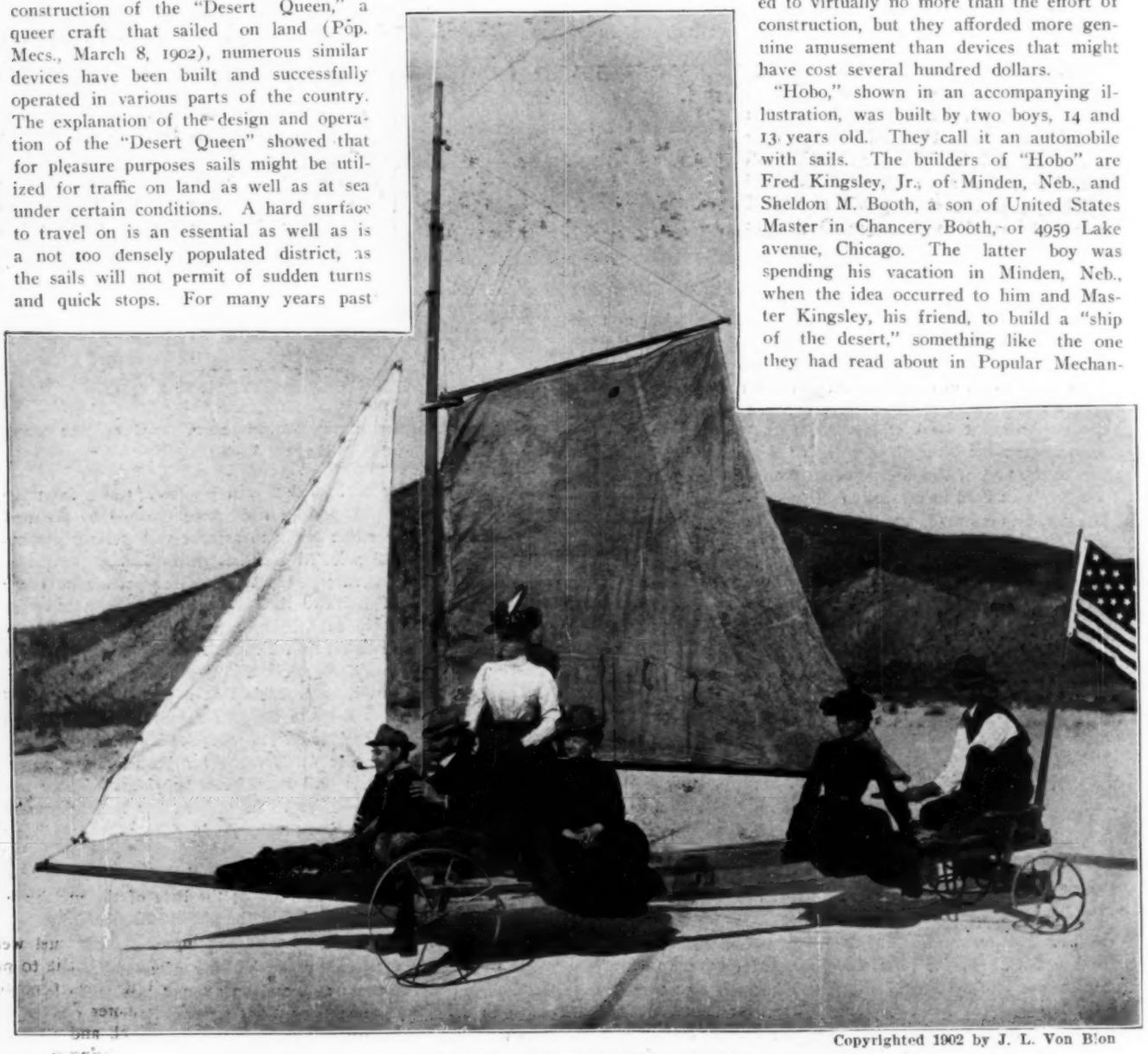
Fig. 3.—The Train of Construction Materials.

Sailing Boats on Land All the Style

Many Strange Winged Vehicles Suggested by Popular Mechanics' Description of the Desert Queen

Since Popular Mechanics told of the construction of the "Desert Queen," a queer craft that sailed on land (Pop. Mecs., March 8, 1902), numerous similar devices have been built and successfully operated in various parts of the country. The explanation of the design and operation of the "Desert Queen" showed that for pleasure purposes sails might be utilized for traffic on land as well as at sea under certain conditions. A hard surface to travel on is an essential as well as is a not too densely populated district, as the sails will not permit of sudden turns and quick stops. For many years past ice boats with sails and skaters propelled by sails have been common sport in the far north, but it seems to have not been known before that still greater enjoyment could be afforded by the means of sails on land in summer. Last summer simple sailing rigs on land of varied and unique design were all the fashion. The custom was just getting under good headway when the season ended. It will doubtless become more general next year. This is indeed an unique departure in summer amusements and promises well. The close of warm weather saw sailing cars, sailing wagons, sailing buggies, sailing bicycles and sailing automobiles. Most of these were built and equipped from old material by the persons who operated them. The cost amounted to virtually no more than the effort of construction, but they afforded more genuine amusement than devices that might have cost several hundred dollars.

"Hobo," shown in an accompanying illustration, was built by two boys, 14 and 13 years old. They call it an automobile with sails. The builders of "Hobo" are Fred Kingsley, Jr., of Minden, Neb., and Sheldon M. Booth, a son of United States Master in Chancery Booth, of 4959 Lake avenue, Chicago. The latter boy was spending his vacation in Minden, Neb., when the idea occurred to him and Master Kingsley, his friend, to build a "ship of the desert," something like the one they had read about in Popular Mechanics. The result is one of the cleverest contrivances ever devised by two boys. This latest "mechanical dromedary" guided by sails skims along the hard dirt roads in the vicinity of Minden with the speed of the wind. Moonlight outings on the "Hobo" are the rarest of sports. It slips noiselessly through the night like a white-sheeted ghost. On its first trip the inhabitants of Minden were terror stricken. In the night they could distinguish little more than the specter-like whiteness gliding through the air, and belated travelers fled in terrified amazement, believing it an unnatural visitation. There was much joking in Minden when the real cause of the fear was made known.



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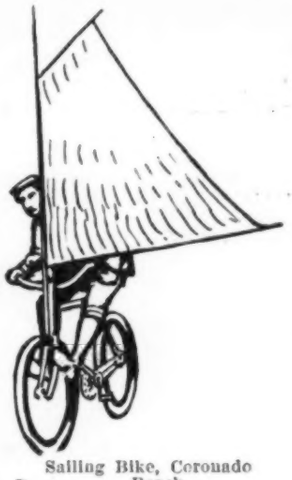
The "Desert Queen" of Majava Desert

The "Desert Queen" described in the March 8 issue of Popular Mechanics, is used for traffic on the once dreaded desert of Majava, in Southern California. It has attained a speed as high as 80 miles an hour, and has obliterated all the perils and horrors formerly attended with the crossing of this solitudinous waste. It was built by Charles S. and Carl L. Hoyt of Cleveland, O., who have a gold mine in the buttes near Rosemond, Cal.

"Hobo" will seat as many as seven children, the vehicle being 12 feet long and 8 feet wide. It is propelled by a mainsail and a jib. The mast is 11 feet high. The rudder is worked from a rod attached to the right side of the rear axle. The front wheels were obtained from an old cultivator that was out of use. The rear wheels are from a cast away toy wagon. Thus the entire construction costs the boys less than $2 actual expense, and it has afforded ceaseless amusement to nearly every child in Minden.

Another illustration shows a sailing bicycle, which, the designer says, was also suggested by the Popular Mechanics article on the Desert Queen. The bicycle is the property of James Fleming, of San Francisco, Cal., and was used by him during his summer vacation at Coronado Beach. The device is simply an ordinary bicycle with a sail attached. Its appearance at the beach led to the construction of many others, and at evening the seashore is often lined with the "white winged wheels," as they are called. They swept along the sands with a speed of 40 miles an hour.

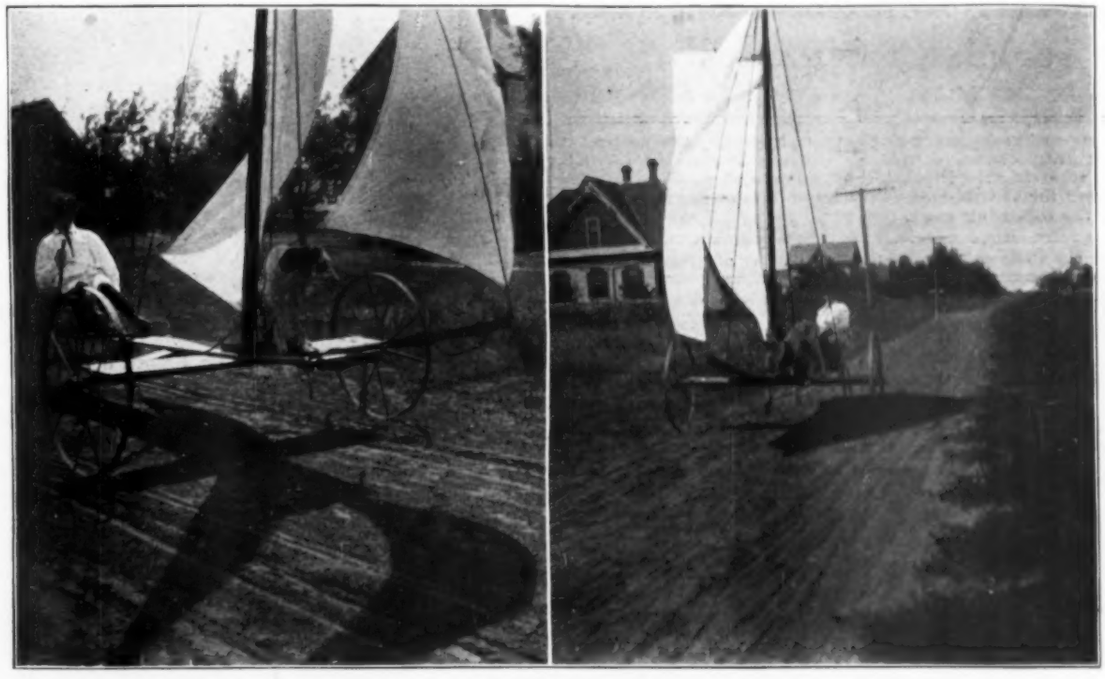


Sailing Bike, Coronado Beach.

MADE A FORTUNE RAISING FOXES.

Maine Man Sells Their Hides to European Royalty for Princely Sums.

Raising foxes is a better paying business than raising cattle, horses, hogs, or such domestic stock, as is well demonstrated by the efforts of one Elijah Norton in Maine. He has a fox farm on a rough hillside not a half mile from the business center of Dover. He founded the business three years ago, made money out of it the first year, and has amassed a fortune during the last two years. He raises foxes of fine fur, such as the silver gray, and sells their skins to the royalty of Europe, who often pay as much as $1,000 or $2,000 for a single hide. He recently sold a fine skin for $2,900. The fur is used in trimming royal robes. Mr. Norton also raises the Alaska blue fox, the hides of which sell from $25 to $50 each, and a few of the red foxes are seen. The farm is fenced in with strong wire netting 17 feet high, and extends into the earth to a depth of three feet, to prevent the animals from digging their way out. The farm is dotted with buildings for the foxes to go into at night. They look like big dog-houses. The different breeds are kept separate by means of wire partitions.



The "Hobo" of Minden, Neb

Editor Popular Mechanics:—We are sending you pictures of "Hobo," which we thought maybe you would like to print in Popular Mechanics. You see it is something like the "Desert Queen." One of the pictures is where it is going at full speed, and one where it is just ready to start. "Hobo" was built by Sheldon M. Booth of Chicago and myself. I could not get both of us in the picture because one of us had to snap the camera.

FRED KINGSLEY, Jr., Minden, Neb.

Barbed wire telephone lines are becoming numerous and popular in California. The Pacific States Telephone Co. are allowing connections with its long distance lines.

The rotation of a waterspout at the surface of the sea has been estimated at 354 miles an hour, or nearly six miles a minute.

There are 1750 submarine cable lines in the world, operating nearly 200,000 miles of cable.

Nearly every time you read Popular Mechanics you gain information on some subject that is worth more than a year's subscription.

In the tobacco works at Louisville, Ky., 6,000 employes are employed, and will make 25 million pounds this year.

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Entered at the Chicago Postoffice as Mail Matter of Second Class.

SAN JOSE LIGHTED FROM THE SIERRA NEVADA MOUNTAINS 153 MILES AWAY.

Snow flakes which glisten in the sun on the lofty crests of the Sierra Nevada mountains are now made to run the street cars and light the homes and streets of San Jose, Cal. On the night of August 30 power was turned on and every electric light in the city drew its origin from the water power station of the Standard Electric company, 153 miles away, in the heart of the Sierra Nevadas. Over these miles of aluminum wire, strung on high masts, there was harnessed and carried a force that moved the street car lines of the city, the printing presses, the powerful machinery of manufactories, and even the delicate manipulation of the dentists' instruments for drilling teeth. It was the first time in the history of any city that its entire electric power was borrowed from a source so far away.

ICE FOR LONDON COMES FROM NORWAY.

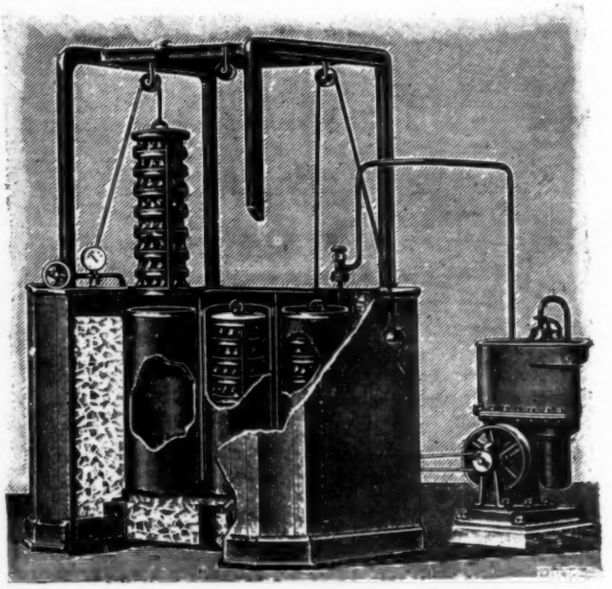
The warm climate of Great Britain prevents any cutting of ice, and most of the supply comes from Norway. During the first six months of this year, however, only 157,000 tons were imported into the United Kingdom. Londoners use ice very sparingly, ice water and iced drinks not being in favor. New York uses ten times as much ice per month as London.

ORIGIN OF THE SEWER PIPE.

Recent excavations in the ancient city of Nippur, the foundations of which were laid 4,000 years before Abraham, have brought to light a system of sewerage. This places the plumber's craft among the oldest of any trade. The sewer was made by breaking out the bottom of stoneware jars and inserting the neck of one jar in the bottom of the next, the joints being plastered with clay. Nippur is located near what is supposed to have been the Garden of Eden.

FRENCH INVENTION FOR PRESERVING FRESH FRUITS.

The display of summer vegetables long after season no longer creates the curiosity it did a few years ago. The remarkable progress in cold storage machinery during the past 10 years



Cold Storage for Farmers.

has done much to furnish our tables in January with edibles that formerly belonged to July. The time is not far distant when every large grower will have his own cold storage outfit.

Experiments have been made in France during the past year with a view to perfecting a small plant easy to operate and inexpensive to run. La Nature, Paris, publishes an illustration of one of these small machines which requires only a 1-horse-power engine, and this runs only three hours out of the twenty-four. The fruit is set upon shelves and the shelves lowered into a cylinder, which is then made air tight. Peaches were selected for the test as a fruit which is specially difficult to keep. Eight thousand were put into the apparatus on September 9 and not removed until 80 days after. They were found to be in perfect condition, both as to smell and flavor, and sold for twenty-five cents apiece. Some partly decayed fruit was included in the test, and when removed was in as good condition as when put in.

RAFT ONE-THIRD OF A MILE LONG.

The largest lumber raft that ever floated down the Mississippi river recently reached St. Louis. It was twice as large as the largest raft that ever navigated the river, containing 14,000,000 feet of lumber, and measuring 1,715 feet long and 237 feet wide. It had a depth of 3 feet. In telling the story of this gigantic craft, a writer says the lumber in it would have made a train load more than ten miles long; that it weighed in the water 28,000 tons, and that the lumber was worth $210,000. The rafting crew numbered 23 men.

NEW REFRIGERATOR CAR.

The latest refrigerator car has an air-pump connected to one of the axles of the car, which takes air from a point a few inches above the floor and returns it near the ceiling. The air is conducted through pipes packed in ice. What happens when the car is sidetracked in a hot sun for a few hours is not stated.

BREAD LIKE THEIR GREAT-GREAT-GRANDFATHERS MADE.

No Change in Bakery Methods in Turkey for Hundreds of Years.

A modern biscuit factory constructed on the American plan is something of a novelty in Constantinople, where the bakery methods have otherwise undergone little or no change for several hundred years. The factory is owned and operated by H. Jucknavorian & Sons. In a letter to the Baker's Helper Mr. Jucknavorian says:

"My father, Harootun Jucknavorian, visited America and returned with some machines. This is the only biscuit factory in all of Turkey. While the methods of bread-making in Turkey are extremely primitive, the best grade of bread is much more toothsome than that usually found in America. The ovens used now are the same as found in the ruins of Pompeii. They are about eight feet high, the exterior is square and the baking space circular. They are large large enough to accommodate from 150 to 300 kilo (2 1-5 pounds) loaves at one baking. They have no dampers or other mechanical equipment. The mouth of an oven is simply a hole, and a piece of sheet iron serves as a door. Rock salt and pieces of glass are largely used in the construction. A thick layer is put under the sole of the oven and over the crown, so as to preserve the heat. The oven sole is made of fire bricks, the crown with soft "rubber" bricks. To heat the oven wood is burned on one side of the baking space, and the smoke coming out from the mouth passes through the chimney, which is constructed at the front of the oven just over the oven's mouth.

The Baker's Helper says: In Constantinople there are 250 bakeries for pastry alone. In this trade the use of chemicals is

A Turkish Baker Selling "Beoreg."

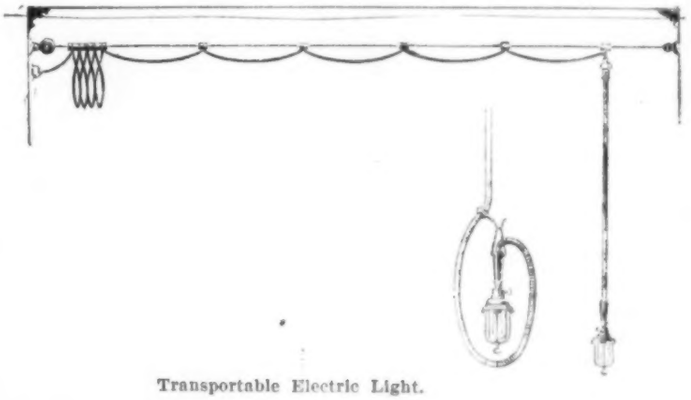
completely unknown, and like bread bakers, leaven is the only fermenting agent used. "Baklava" is excellent pastry, very light and palatable; as a preparation it is almost like French puff paste. After preparing the dough with the best Hungarian flour, it is rolled into very thin sheets. The workman who can prepare sheets of dough as thin as possible is considered the best master. These thin sheets are buttered, stacked on each other half an

A Turkish Bakery and Its Workmen.

inch high, cut into diamond forms and baked. When taken from the oven boiled sugar is poured over them. "Beoreg," another delicious pastry, is prepared in about the same manner, except that meat, cheese and other ingredients are mixed with the dough and powdered sugar is sprinkled over them after they are baked.

TRAVELING ELECTRIC LAMPS.

An ingenious device has been put on the English market by which an electric light may be carried to any part of a large room without the annoyance of loose cord. The Electrical Review, London, says: The cord is suspended in loops from small



Transportable Electric Light.

bobbins which stretch along a stretch nickel-plated wire. The pendant which supports the lamp is made capable of extension to more than double its normal length. A hook in the bottom of the lamp permits the lamp to be placed on the floor or at any higher point desired.

The government of Great Britain may be invited to join with the United States in determining what effect the Sanitary and Ship canal at Chicago and the water-power devices at Salt Ste. Marie have had on the water level of the great lakes.

According to President Hill, of the Great Northern Railway, Duluth, Minn., is the largest shipping port in the world, the amount of shipping handled there annually being given as 17,000,000 tons.

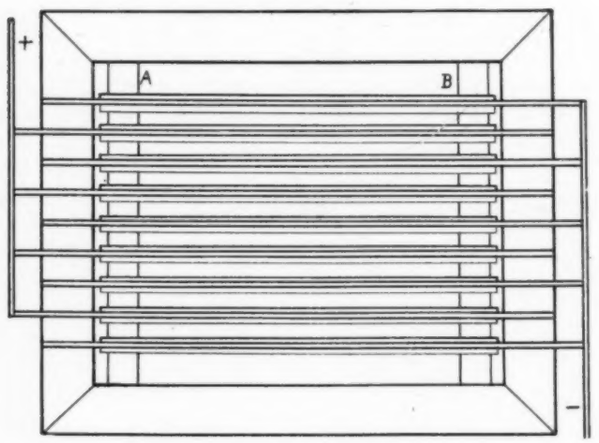
Easy Electrical Experiments

By L. P. Dickinson

HOW TO MAKE A LABORATORY STORAGE CELL--PART II.

In the preceding chapter (September 20th issue) directions were given for constructing the separate parts of a storage cell. Beginning with a negative plate (one which contains litharge) place it in the box, with the longer lug projecting from the left hand side. Next insert a positive plate (one which contains red lead) with its longer lug projecting on the right hand side. The two plates should be separated by two of the small strips of paraffined wood, these strips being inserted vertically at each end. Next insert a negative plate, and then another positive, and so on, the plates being alternately positive and negative. All the negative plates should have their longer lugs on the left, and all the positive plates should have the longer lug on the right. Since there are five negative plates and only four positives, the outside plates will be negative. The plates should not touch each other at any point.

Next insert the heavier strips of paraffined wood on each side of the plates between the plates and the box, as shown at A and B. These strips should wedge the whole cell firmly together, so as to prevent the wooden strips from floating when the cell is filled with acid. Yet care must be exercised not to spring the sides of the box, causing it to leak.



Plan View of Storage Cell.

Solder a strip of lead along one end, connecting all the negative plates together. Do the same at the other end with the positive plates.

When ready for charging, the cell is to be filled with a solution made by slowly pouring sulphuric acid into water, the proportion being one part of the acid to twelve parts of water.

In order to charge the cell, four gravity cells will be required. The method of connection is shown in Fig. 2. The gravity cells are joined in series, and the positive pole of the storage cell is connected to the copper terminal of the group of gravity cells, and the negative pole to the zinc terminal. There must be no mistake about this, for a reversal of current through the storage cell will spoil the latter.

The wires designated by the letters H and K are supposed to lead to a motor or any other device for making use of the electric current.

The operation of the apparatus is as follows: When no current is being taken through the wires H and K, current flows from the positive terminal of the group of gravity batteries into the storage cell. In its passage through the acid in the latter, it decomposes the acid, and the lead plates are attacked and changed. The red lead in the positive plate is converted into a brown mass, while the litharge upon the negative plate is converted into metallic lead. Of course, it takes time to do this,

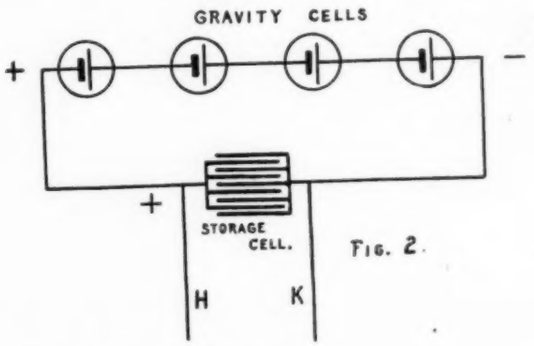


Fig. 2.

particularly when the cell is first set up. A first the current should be allowed to flow uninterruptedly for one week without any current being taken from the cell.

Suppose, now, it is desired to use the cell, after it is charged. Connection is made at the wires H and K, and without disconnecting the gravity batteries a strong current can be taken from the cells. Most of the current will be furnished by the storage cell, but a little of it will come from the gravity batteries, the latter being thus made to do continual duty.

It is always necessary to remember that no more energy can be taken out of a storage cell than is put in. For example, if ¼ ampere flows into the storage cell for 20 hours, the cell would have received a charge of 5 ampere hours. Now, if the cell were perfect, we could take out from it just 5 ampere-hours of work. That is, we would take out 5 amperes for one hour, or 2 amperes for 2½ hours, or one ampere for 5 hours, and so on. But no cell is perfect, and we can never take out as much as we put in. As a matter of fact, the present cell, if pushed to its limit, ought to give a capacity of 8 ampere-hours when discharging at a rate of 1¼ amperes, or 6 ampere-hours when discharging at the rate of 1½ amperes.

BIG ORDERS FOR NEW LOCOMOTIVES.

Pennsylvania Places $3,000,000 Contract—Foreign Countries Join in the General Demand.

The Pennsylvania Railway company has just placed an order with the Baldwin Locomotive company for 250 new freight locomotives. The total cost of the purchase will amount to more than $3,000,000. The same railroad, it is said, will soon place an order for 150 more locomotives with the American Locomotive company, making a total of 400 new locomotives the Pennsylvania will soon put in service on its lines.

There has been a great revival in American locomotive building recently in all directions. Europe, Asia, Australia, Africa and South America, together with the United States, demand for immediate delivery as many locomotives as our shops can produce. The American Locomotive company has recently received extensive orders from Cape Colony, New Zealand and Japan. From England and Germany, where the locomotive makers say the American engines consume too much coal, big orders are being placed by railway companies for the American "iron horses." This is because they cannot afford to wait on the slow methods of the British manufacturers. The American locomotive maker knows the meaning of a "rush order," and while his locomotive may have a tremendous appetite for coal, they can be ordered, designed, built and shipped across the ocean before the English or German builder has finished the plans for the fireboxes.

AIRSHIP RIDES THE WINDS AT WILL

Mooted Problem of Aerial Traffic May Have Been Solved by Stanley Spencer, an Englishman

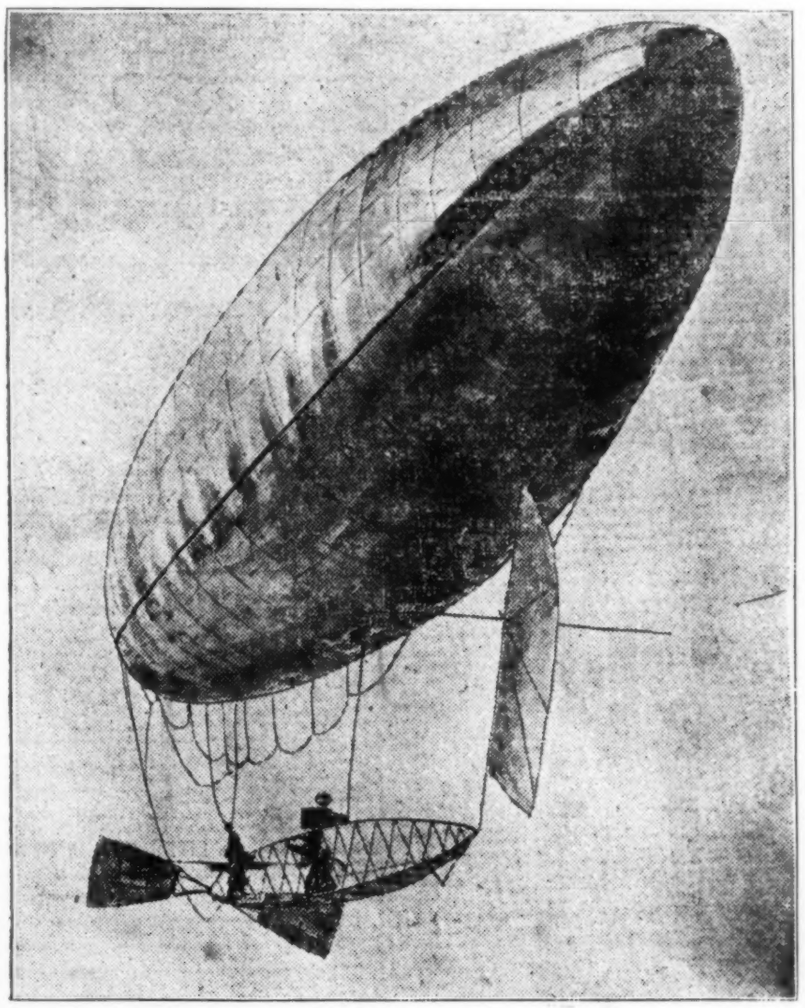
Has it remained for an Anglo-Saxon to solve the problem of aerial navigation? Scientific aeronauts throughout the world are enthusiastic over the late feat of Stanley Spencer in London. It minimizes the greatness of Santos Dumont's achievement in encircling the Eiffel tower and causes many to believe that man has at last realized his long cherished desire of harnessing the winds for his service in aerial traffic. Spencer's airship, looking like a bottle-nosed whale, sailed from the Crystal palace over St. Paul's, went as far as Ealing, circled above that suburb thence altered its course in a northeasterly direction and sailed well against the wind toward Harrow.

It made an easy descent in the little village of Eastcote. Aeronaut Spencer covered a distance of 30 miles in 1 hours and 45 minutes without a hitch. He proved that he could steer his ship at will, sail in any direction he liked and make fairly good time against the wind. The start was witnessed by a great crowd of cheering Londoners. Spencer, in his ship, rose to a height of 300 feet, traveled in a bee line for about a mile and then made various detours to show that he could steer the ship as he wished. As he passed over different parts of the great city and suburbs the residents were thrown into a turmoil of astonishment and in some districts they were thoroughly frightened.

Spencer's journey exceeded the longest trip of Santos Dumont by nearly 20 miles. His airship differs from Santos Dumont's in having a blunt tail and nose and in being propelled in front. The bag is 75 feet long and contains 200,000 cubic feet of gas. The frame is of bamboo. Being propelled in front, the designer claims, renders the ship more manageable, as the steersman can see the whole mechanism. A simple pressure of a button sets the airship going and stops it.

Stanley Spencer, Aeronaut.

It is worked by a motor of three horse power, placed at a safe distance from the gas valve. The speed in moderate weather is 15 knots per hour. It weighs 600 pounds and carries only one person at a time. The car is practically only a frame with a flooring of roped bamboo. The fuel is petroleum, which flows along a metal pipe inclosed in water jacket, and the exhaust terminates in a Davy safety lamp, rendering an explosion impossible. It has special equipment to prevent pitching and dipping and a "blower" by which gas can be pumped out at a rapid rate and air pumped in.



Airship That Sailed Over London.

TRAVELING MACHINE SHOP.

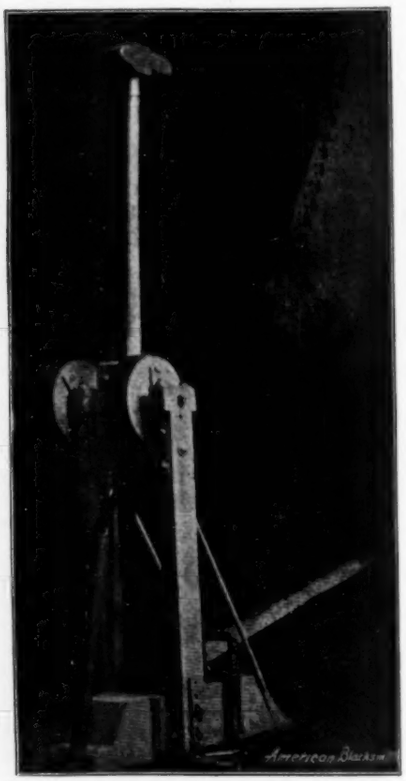
A large concern in the East which does a great deal of repair work for rolling mills and wire works, has fitted up a complete machine shop for making unusual repairs, and installed it in a railroad car which was built to order. An electric motor furnishes the power for the machines, and the company's best experts are sent along to do the work. When a hurry call comes in the car is attached to a passenger train and hurried to destination where it is switched into the yard of the big plant where the break down is to be repaired. Wires are run out of the car and connected up to furnish power and light, and within a remarkably short space of time the men are at work. The assortment of tools includes many unusual and expensive articles not found among the outfit of the ordinary plant.

After waiting in vain for the men to act the women of Utica, Mich., have donned working garb and commenced to improve the streets and sidewalks. Already they have built more than a mile of sidewalks and cleaned several of the streets.

SHOP NOTES

HOME MADE FOOT-POWER HAMMER.

A home-made foot-power hammer easily constructed and inexpensive, is described in the American Blacksmith. It is the invention of L. Van Dorin, but is not patented and may be used by anyone. It can be adjusted to strike any point on the anvil; work easily; and the hammer can be removed in half a minute. The maker says:



Hammer Complete.

The base, A, is of pine, 6 x 8 x34 ins., and to it are attached two standards B. These are also of pine 2 x 3 x 30 ins., and are braced by the rods C. The foot lever, of ash, 1¼ x 1½ ins. and 54 ins. long, is hinged twelve inches from the foot plate end, so as to fold out of the way when not in use. Two angle irons with through bolts serve to secure the standards to the base, as clearly shown in the engraving. On top of the standards are placed the joined boxes, 1¾ x 2 x 4½ ins. These I make of ash, in halves and secure by small strap bolts. A stirrup, represented in the drawing by D, sits over the base to hold it steady, and is itself held by four eye bolts screwed into the floor. The lifting spring which I use is 20 ins. long over all, with capacity for swinging a 12-pound sledge, or 100 pounds lifting power.

The two pulleys EE, are connected by leather straps, one with the treadle and the other with the lifting spring. The lower end of this spring engages a hook on the base, as shown. The treadle strap fastens to the pedal just back of the hinge. The pulleys are 8 inches in diameter and 2 inches thick, the distance between them being 8 inches. They are rigidly fastened to the shaft F. To it are also fastened two blocks, one carrying the sledge hammer handle G, and the other having bolted to it two plates from an old buggy spring. This strikes a block on the base, bringing the hammer and pulleys to a stop on the upward stroke without jar.

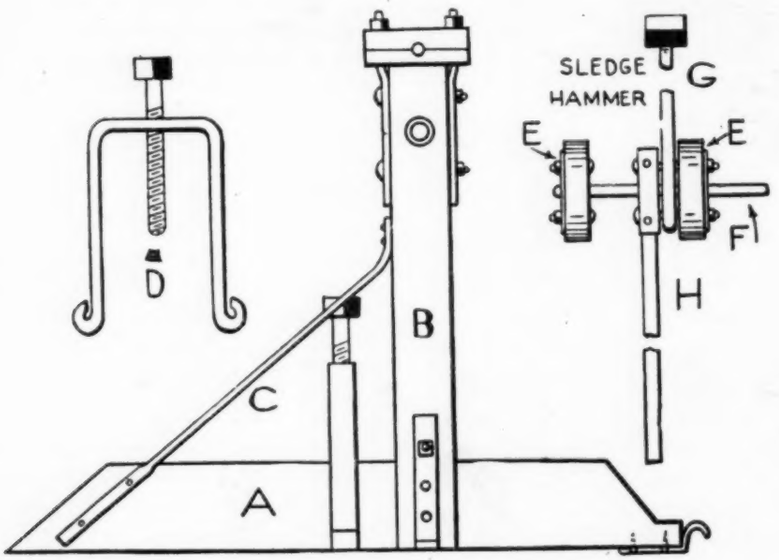


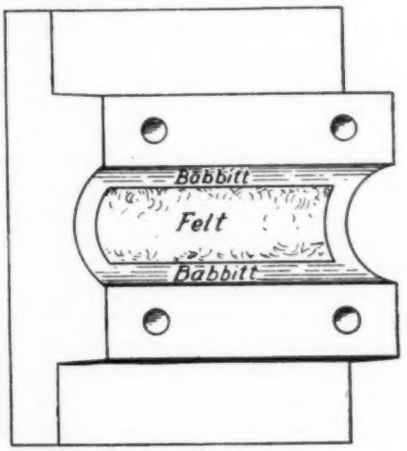
Fig. 1. DETAILS OF FOOT POWER HAMMER.

BABBITING BAND RESAW BOXES.

A reader of the Wood-Worker contributes the following to that paper:

I use 18-gage saws, 6 inches wide, 32 feet long. The wheels on my machines are 5 feet 6 inches diameter and make 490 revolutions per minute. Use nothing but engine oil.

To babbitt the boxes on these machines, wrap the journals with writing paper and



A Babbitting Kink.

pour cap and lower half of box at same time, using wooden liners. On lower (or driving) wheel babbitt only a strip an inch wide around edges and ends of box—see sketch. The cap I babbitt full. The wear is on the cap. In lower half use thick felt, usually cut from the top of a felt boot. In the top box babbitt the lower part full and use felt in the upper half. Scrape all boxes to a good fit.

To pack my boxes I use two pairs of cardboards for top and bottom on each side of box, using writing paper for rest of packing. Screw bolts down until there is no play of shaft and just so it can be turned by hand. I babbitted these machines sixteen months ago and have only taken out one liner on each side. My machines will run five minutes after the belt is thrown off the tight pulley.

CALKING BOILERS.

If leaks develop in gaskets the bolts holding same should be tightened; if in seams or rivets, so that the water squirts out, the pressure should be dropped to not exceed 50 pounds for high pressure boilers or 25 pounds for tubular boilers, and then the bad places calked with the proper tools. It will do no hurt and is even safer to let the pressure off almost entirely before calking, and this is especially desirable if there are several leaks or continuous leaks in seams. It should never be attempted to calk a boiler under full water pressure, as the boiler is then under heavy strain, and, being full of water, is especially rigid, and a sharp

blow may start serious leaks in several places at once. Raise the pressure again, watching the seams as before, and repeat the operation until the pressure is raised to about 50 degrees above the regular steam pressure at which it is to operate, without having any metal-to-metal joints running or squirting water. A small seep or sweat is allowable, as these places will close up as soon as the boiler is heated. All this is really the business of the boiler erector, but sometimes the engineer in charge is supposed to do all this himself.

THE ORIGIN OF NAIL TERMS.

The terms "fourpenny," "tenpenny," etc., as applied to nails, refers to their weight by the thousand. Sixpenny nails are nails a thousand of which weigh six pounds; tenpenny nails weigh ten pounds to the thousand. It is an old English term, and meant at first "ten pound" nails (the "thousand" being understood), but the old English clipped it to "ten-pun," and from that it degenerated until "penny" was substituted for "pounds." When a thousand nails weigh less than one pound they are called tacks, brads, etc., and are reckoned by ounces.

CORRESPONDENCE.

Will the Chicago subscriber who sent in the sketch of the small boiler which he constructed from piece of large steam pipe, be good enough to call at this office or send us his address.

ORIGIN OF HORSE-POWER UNIT.

The term horse-power as applied to an engine is imperfectly understood by many. About the first use that the steam engine was put to was raising water from mines. This usually had been done by horse-power, so when an engine builder came to introduce his engine to a buyer he was naturally asked how many horses it could take the place of. A strong horse was able to travel 2½ miles per hour pulling a 150-lb. weight out of a shaft by means of a rope and pulley, while working 8 hours per day. When a horse moves 2½ miles per hour he travels 220 feet per minute, and at this speed the 150 pounds would be raised vertically that distance, that is equal to 300 pounds lifted 110 feet per minute, or 3,000 pounds lifted 11 feet, or 33,000 pounds lifted one foot in one minute, which is taken as a standard rule for one horse-power.

TO DRILL CHILLED CAST IRON.

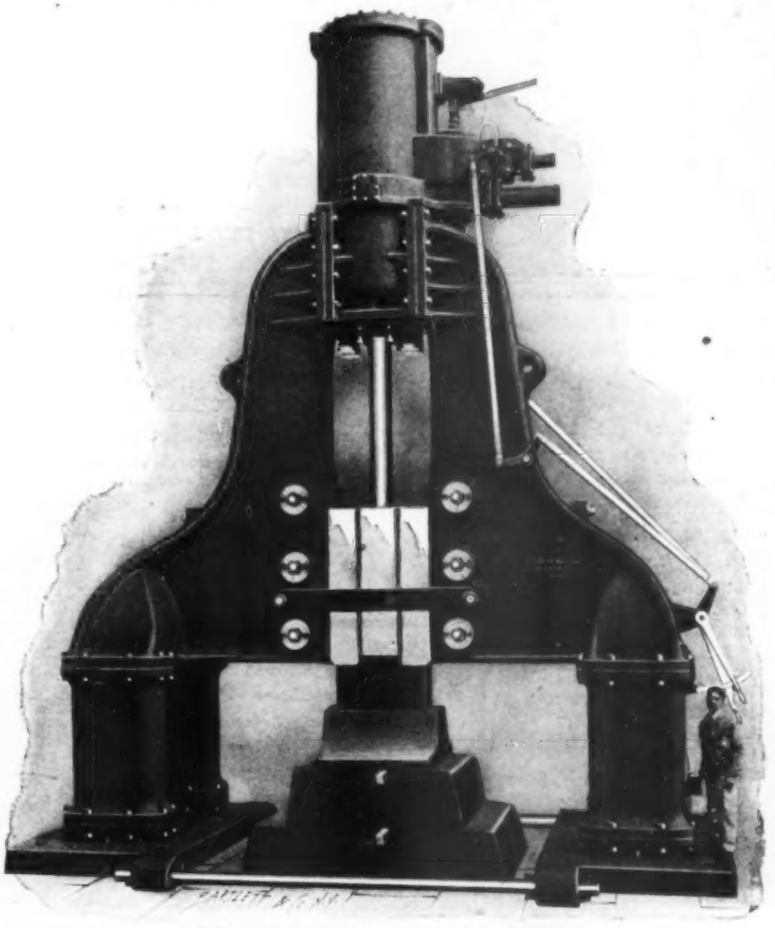
To drill chilled cast iron first draw the chill. This is done by laying the piece on the forge, covering the spot to be chilled with sulphur, and working the bellows slowly until the sulphur is burned off. Then proceed with the drilling.

GREAT STEAM HAMMER WEIGHS 176 TONS.

Is Over 25 Feet High—Strikes a Blow of 20 Tons—A Child Could Set the Giant in Motion.

A thousand men pounding with might and main could not strike the blow delivered at a single stroke by a modern steam hammer, the operations of which are controlled by one man using one hand. Indeed the great iron forgings of to-day could never have been made by hand, even by the strongest and most skillful workmen.

A strong man weighing 175 pounds swinging a sledge wields a blow of about 75 pounds. Compare this with the great steam hammer shown in the cut, which weighs 176 tons and strikes a blow of 20 tons, and you have an idea of what steam and machinery can do. So perfect is the mechanism and so absolutely under control, that a child has strength enough to set the giant in motion. The operator stands at one side and by means of levers controls the flow of steam into the cylinder at the top of the frame. This cylinder is three feet in diameter and eight feet long. The piston with its rod and hammer weigh 24,000 pounds, and the force of the fall of this great weight is increased by the power of the steam in the cylinder which drives it down. The machine is over 25 feet high. It can be set to strike at will, or to hammer continuously until stopped. Strong foundations must be provided, not only to sustain the 176 tons of metal in the machine, but to withstand the shock of the blows struck. The machine just described is made at Philadelphia by Bement, Miles & Co., and is known as a double frame steam hammer.



24,000-Pound Double Frame Steam Hammer.

ENGLISH COAL FOR AMERICA.

Rather than pay the exorbitant price charged for American coal the Philadelphia school board and New York concerns are importing the best quality of anthracite from England at a cost of only $6.50 per ton. The school board has just concluded a contract for 25,000 tons. Four thousand tons of coal for New York are being shipped from Swansea, Eng., on the steamers Glenroe and Devonshire. It is said that numerous other American concerns will soon follow suit and heavy importations are expected during the next six months.

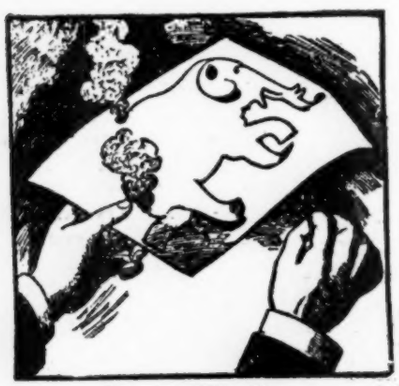
An electric power plant to generate 40,000 horse-power will be erected on the Susquehanna river, about 35 miles from Baltimore.

FINE DRAWINGS.

Show the audience an apparently blank shet of white paper, touch it with a glowing match, and in a short time you have a figure burnt out of the paper.

The preparation of such fire drawing sheets is simple, and everybody with a little talent for drawing can produce them at small expense.

Dissolve a tablespoonful of saltpeter in



Drawing With Fire.

a tumbler of water and draw with the help of a pointed brush an outline figure on thin white paper, and put it aside to dry. The drawing on the paper will be invisible. Then light a match, blow it out immediately, and touch a certain point in the outline figure (which we have marked secretly) with the glowing match. The saltpeter will catch fire immediately and burn along the line drawn with the brush, burning out the figure as it goes along.

CORRESPONDENCE SCHOOL BRANCHES OUT.

The Great Mechanical College to Be Affiliated with the Armour Institute.

The endorsement of the American School of Correspondence by Dr. Gunsaulus, president of the Armour Institute of Technology, shows in a striking manner the wonderful advancement in the standard of correspondence instruction in the past few years and marks a new era in the educational possibilities of the common people. Arrangements have been made whereby the faculty of the Armour Institute is to co-operate with the American school in the instruction of students by correspondence. The correspondence school will have an establishment on the Armour Institute premises in Chicago. Dr. Gunsaulus has been made chairman of the advisory board of the American school and in this capacity will sign all the American school diplomas. Dr. Gunsaulus is enthusiastic over the educational possibilities of the new work and it was at his invitation that the change was made.

A. E. Zapf, secretary of the American school, said: "It should be understood that our school in no way loses its identity by this change in location. It remains a separate institution under its own management but with the fullest co-operation and help of the president of the Armour Institute of Technology. Our students' work being done under the members of the faculty of the Armour Institute, their examinations credits will be counted towards a degree in the Armour Institute and they will be admitted to classes there in those subjects which they have passed by correspondence. Furthermore we shall make a systematic effort to assist our students to procure positions in Chicago and vicinity, and hereby enable them to attend the excellent night schools of the Armour Institute. It is our aim to make every portion of the various courses as thorough as possible and we are employing the most competent writers that we can secure for that purpose."

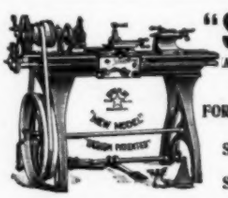
PROTECTS INVENTORS FROM PATENT THIEVES.

Numerous Outrageous Infringements Gives Rise to a Company that Guarantees Protection.

In this day when valuable patents are often rendered worthless to owners by the infringement of unscrupulous corporations it is gratifying to note the establishment of a powerful patent protection company that will guard the rights of American inventors. Popular Mechanics, devoted principally to accounts of new and great inventions, has on many occasions learned of instances where a life's efforts have been wasted through infringement on patent rights. The conditions were becoming so that none but a millionaire was sure of retaining his patent rights without having them ruthlessly appropriated by another. Besides losing his patent, the patentee often squandered the savings of his lifetime in vain efforts to save his invention from the hands of such theives. Here is what one of our subscribers who had thus become victimized, said in a communication:

"The courts only guarantee the inventor such justice in the protection of his patent as he has money to pay for. Justice to the inventor costs money. The more money he has the more justice he gets. When a poor man has an invention that proves attractive to a wealthy corporation, it is foolish for him to resist. He will lose all in the end. The wisest policy for him is to take whatever the corporation offers and be satisfied. No matter how small the compensation may seem it is the poor man's only chance. America's patent laws are for the protection of the corporations."

How truly this man spoke many others can attest. The concern that has now made its appearance in the midst of such a condition of affairs, will doubtless be hailed with cheer by inventors everywhere. It is known as the Pacific Patent Protection Co., with offices in the Mills building, San Francisco. The company is preparing, however, to open branches in all the large cities of the country. This concern charges a nominal annual fee to the inventor in return for which it guarantees the very best protection to his patent. It also undertakes cases in which patents have already been infringed. It employs a corps of patent lawyers and mechanical experts of the highest skill to watch over the rights of its clients and to prosecute infringers. It offers the same protection to trade marks and labels as to mechanical inventions.



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LOCOMOTIVES.

In this chapter we come to the "Atlantic" type, which has proven the most successful and advanced high-speed locomotive so far produced. The popularity of this type has been well earned, having experienced great opposition from various locomotive builders and railway men. The first "Atlantic" type locomotive was built by the Baldwin Locomotive Works in 1895 from designs by William P. Henszey. (Figs. 43 and 44.) Today this type is used by all the leading lines in the country, and is being built by other builders under such names as the "Northwest" and "Chautauqua" type. These engines have the highest speed record of the world, and are now being copied by many of the leading lines on the continent as well as by some English lines.

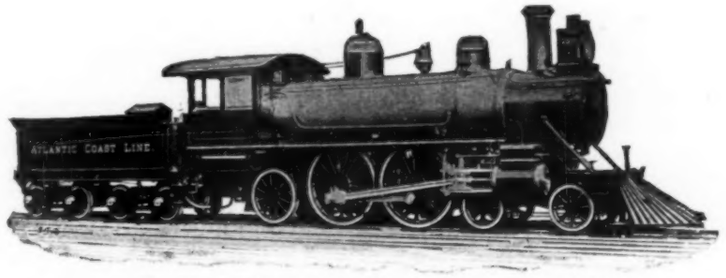

Fig. 43.—Baldwin's Atlantic Type Locomotive—1895.

At the present time the railway world is wrestling with the "Vanderbilt" (Fig. 45). Its success now seems to hang in the balance, although it is being extensively used for heavy mountain traffic. The boiler was designed and introduced by Cornelius Vanderbilt. The abolition of stays, etc., is a great advance, and the rapidity with which the fire can be renewed and the absence of many repairs generally on a locomotive commend it.

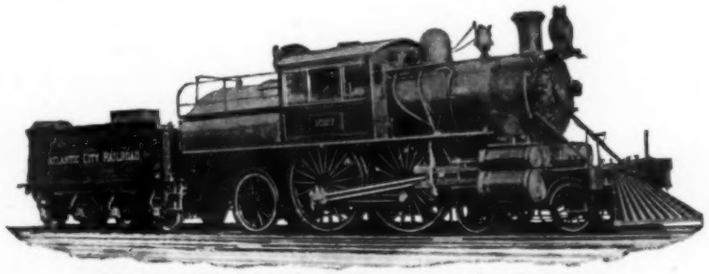

Fig. 44.—Baldwin's Atlantic Type Locomotive, P. & R. R.

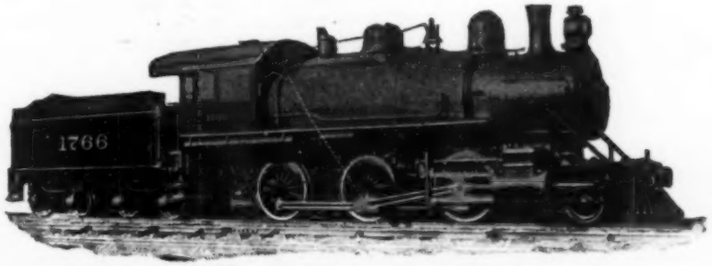

Fig. 45.—Baldwin Locomotive with Vanderbilt Boiler.

MAKE PAIR OF SHOES IN THIRTEEN MINUTES.

Lynn, Mass., holds the record time for making shoes. A pair of woman's button shoes was made in thirteen minutes. The making required 57 different operations and the use of 42 machines. There were put into the shoes 6 pieces of leather, cut from one side, 14 pieces of cloth, 24 buttons, 80 tacks, 20 nails. two box toes, two steel shanks two moulded counters, two taps, two heels and 20 yards of thread.

A Pittsburg inventor has taken out a patent for making artificial sand to be used as a substitute for ordinary river or pit sand in the manufacture of cement, mortar, brick, etc.

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This offer will challenge the attention and consideration, and afterward the gratitude of every living person who desires better health, or who suffers pains, ills and diseases which have defied the medical world and grown worse with age. We care not for your skepticism, but ask only your investigation, and at our expense, regardless of what ills you have, by sending to us for a package. You must not write on a postal card.

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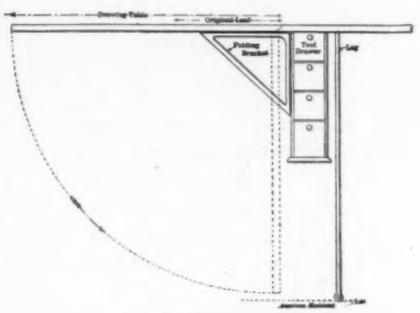
SEWING MACHINE DRAWING TABLE

A writer in the American Machinist tells how he converted his wife's sewing machine into a very serviceable drawing table to use at home. He says: "The machine had a drop leaf at the side. I removed the drop



SEWING MACHINE DRAWING TABLE.

leaf and in its place put a soft pine board 2 inches wider than the length of the one taken off and long enough to reach the floor when dropped down, making the board 30x20 inches. In the top drawer in sewing machine I kept drawing tools, etc., which is a good feature, as the tools are safe, and when drawing the tools are at your right hand. Aside from the handy drawing board feature, my wife says she would not have the board removed, as it is far more convenient than the original table for sewing purposes."

ELECTRIC WATCH TO RUN FIFTEEN YEARS.

A Swiss watchmaker has succeeded in producing a watch which is expected to run 15 years with one winding. The expert at the Neuchatel observatory, who has tested it, reports the watch had a variation of only one-fifth of a second during the five weeks' record. Electricity is said to have a part in its operation, but just how is not stated.

URALITE—NEW MATERIAL THAT RESISTS HEAT.

Uralite is a new article made from asbestos fibre and specially prepared silica by a chemical process which takes 17 days. The product has the remarkable property of withstanding heat, and a sheet of uralite takes 30 times the amount of heat to warm through which would heat a sheet of iron of equal thickness. It is waterproof and unaffected by heat, cold and such gases as destroy iron.

It is intended for construction purposes where fireproofing is desired, and takes paint and graining like wood. It can also be made up into armour suits for use by firemen and men working in places where it is necessary to protect the body from intense heat

THAT LITTLE LAD O' MINE.

You ask me why I blow her off?
"Why whistle?" do you say?
"When neither bridge nor turn's in sight,
And nothing's in the way?"
I'll tell the reason, fellows, though
'Tis one you'll not divine.
I blow the whistle, just to please
That little lad o' mine.

You didn't know I had a child?
You've never seen him? No.
He went away three years ago,
Up where God's lilies grow.
But every birthday that he had,
When he was well and fine;
At nine o'clock, I whistled for
That little lad o' mine.

I'd told him how 'twas, when he came,
His daddy was so glad,
To show his joy he whistled off,
And let her shriek like mad.
So every birthday after that,
When Old Sol said 'twas nine,
I always whistled, just to please
That little lad o' mine.

I see him now, just as he stood,
His blue eyes full of glee,
And, "Let her go, now, daddy, do!
Just let her shriek!" cried he.
"For I am six years old!" he said,
"So let her blow! 'Tis nine!"
And how I blew her! Just to please
That little lad o' mine.

And since he's been up there, you see,
I like to think he knows,
And that he's looking right down here,
Now while the whistle blows.
I seem to hear him call to me,
"Now, daddy, now, 'tis nine!"
I think he listens while she blows,
That little lad o' mine.

—American Thresherman.

YACHT MAKES GREAT SPEED.

The remarkable and record-breaking speed of 44.13 miles an hour is claimed for the steam yacht "Arrow" in a test the other day on the Hudson river. The run over a measured distance of 6,080 feet was made in 92 seconds, with two boilers. On a previous run she had made 5,280 feet in 1:37.5, or a speed of 36 miles an hour.

AN IMPORTANT ANOUNCEMENT TO OUR READERS.

Every reader of the Popular Mechanics who is ailing or in poor health, or has some friend or relative that is sick, should be interested in the offer, on another page, headed "Personal to Subscribers," made by the Theo. Noel Company, of Chicago. The company is the proprietor of the famous Vitæ-Ore, a natural mineral medicine which they offer to send out on trial to every subscriber or reader of this paper, or a friend or relative recommended to them by a subscriber or reader. Those of our readers who have not already used this medicine and know of its merits should not fail to avail themselves of this most liberal offer. The company making it is reliable, and will do just as they agree to do in their announcement.

GRUESOME INVITE TO PRESIDENT ROOSEVELT.

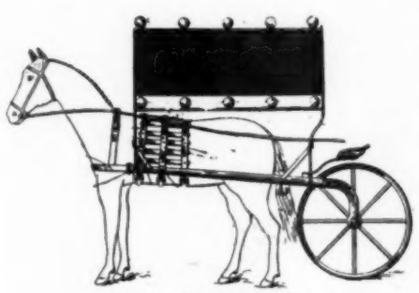
An invitation written on the scalp of an Apache Indian has been sent to President Roosevelt by Charles Meadows, of Los Angeles, Cal. Meadows is better known as "Arizona Charlie." The scalp is one of many he possesses as relics of a fight with the Apaches in Crescent Valley, Ariz., in 1884. The invitation requests that the president join in an expedition to explore Tuburin Island, that mysterious Mexican land into the interior of which it is said no white man has ever penetrated. The party will go there by direction of Gen. Andrade, Los Angeles consul of the republic of Mexico, who owns the island. They have been promised military assistance by Gen. Torres, military commander of the department of Sonora.

DEMAND FOR WALNUT IN EUROPE.

So popular is black walnut furniture abroad that English and French agents in America are buying old barn timbers and fence rails made from the valuable wood by inappreciative American ruralists. Fifty or seventy-five years ago, when the farmer's chief desire was to clear the dense forests to make way for crops, they laid barn floors and made barn mangers from the finest walnut, and many of the trees were split into rails. Many of these are now in good condition and find ready sale. This waste of the valuable timber was probably greatest in Ohio, where one of the few walnut groves left was recently sold for export as lumber. One tree in this grove, which was eight feet in diameter at the stump, brought $1,200.

PORTABLE INSECT CATCHER.

A device to catch bugs on a large scale is the idea of Martin B. Gooing, of Vicksburg, Miss. A large net is arched on bars



Catcher Ready for Use.

which are fastened to the thills of the vehicle in which the driver rides. A series of lamps are placed at the top and at each side to attract the insects which are drawn to the net and caught thereon by some sticky substance. The catcher is driven slowly through the orchard at night.

COAL STRIKE HAS COST $118,920,000.

The coal strike, it is estimated, has cost the operators in price of coal $33,200,000; strikers in wages, $24,000,000; employes not strikers, $5,300,000; railroads in earnings, $10,000,000; business men outside the strike section, $8,200,000; the coal and iron police, $1,000,000; nonunion workers, $450,000; troops in the field, $370,000; general damage, $6,500,000—a total cost of $118,920,000.

"Good morning, uncle," said a young man to the town's whitewasher, "how is business, looking up?

"Suah, suah, honey!" replied the old fellow, "it be a-lookin' up, just now. I's white-washin' de ceilin ob de Baptist church sah."

"No work that is sincere and useful is barren of divinity."

ARTISTIC STATUARY OF THE COMING WORLD S FAIR.

"The Flight of Time" is another of the five groups of statuary designed by Mr. Robert Bringhurst for the Textiles building at the St. Louis world's fair. The central fiure is that of Father Time, the scythe in his hand and the winged hour-glass at his feet. At his right reclines the figure of Night, a maiden enveloped in the veil of sleep. At his left is the figure of Morning, a youth who has cast off slumber and is looking away into the new dawn. The ram, the source of wool, is the maiden's companion, whereas the youth rests his hand upon a bale of coton. Thus it is shown that woman's toil and the products of wool are associated with the past, while the vegetable textiles and the labor of man suggests the modern era of industry.

"Want" and "For Sale Ads. 2 cents per word payable in advance. Replies may be sent to a number, care Popular Mechanics, and will be forwarded promptly without extra charge.

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CALENDARS—Employ your spare time selling to merchants; we pay liberally. Write us at once for sample. French Novelty Adv. Co., Easton, Pa.

AN UNUSUALLY FINE opportunity for party to secure working interest (machinist preferred) in fine established paying business in the west. Will bear closest investigation. Call or address "D." Popular Mechanics.

FOR SALE—Stock of hardware, tinner's tools and fixtures; invoice about $2,500; good business. Address J. G. Hoffken, Hampton, Minn.

FOR SALE—Dry goods, shoes, groceries and notions, stock general merchandise; all less than year old; stock $4,000 to $6,000; located in a good town in the richest farming country in central Illinois; time on part if desired; ill health cause for selling; be quick if bargain and good location are desired. Address W. F. H., Box 402, Cerro Gordo, Ill.

FOR SALE—Steam laundry. Cleared $118 above expenses during July. Good reason for selling. Price $900. Address G. E. Suiter, DeWitt, Ia.

FOR SALE—First-class harness shop in central Iowa. Town doing a good business. Address Lock Box 27, Reinbeck, Ia.

FOR SALE—Good clean stock of groceries and fixtures; invoice about $1,800; doing a $1,200 business a month; terms cash. Address Box 654, Union City, Ind.

FOR SALE—An old established harness business of 25 years' standing, including shop and lot; only shop; stock invoice $1,200. For particulars address C. R. Kleeberger, Aurelia, Iowa.

FOR SALE—Only steam laundry in growing South Dakota town. Good bargain for right man. Ill health reason for selling. Address, Beresford Steam Laundry, Beresford, S. D.

FOR SALE—Hotel; on account of death of landlord will sell best paying hotel in Northern Illinois. Yearly profit $5,000 per year. Price furnished, $13,000. Address 449 Popular Mechanics.

FOR SALE—Steam laundry complete, latest machinery, in best 20,000 city in Michigan; last week's business over $500; weekly payroll from $130 to $150; cheap rent; must sell on account of sickness; will take reasonable payment down and balance by month if so desired. Write for particulars. Derby, Choate & Woolfit Co., Flint, Mich.

FOR SALE—Good paying small steam laundry in a booming town of 2,000 in Northern Michigan; cheap, expenses very low. A. L. Deming & Co., Onaway, Mich.

TWO GOOD ELEVATORS for sale, situated on B. & M. R. R. Price $6,000. Fine crop this year. Address F. C. Kellogg, McCook, Neb.

FOR SALE—Fine up-to-date harness stock and fixtures in a thriving town; only shop; invoice about $800. Address Peter L. Lantz, Kirkland, Ill.

FOR SALE—First class modern steam laundry, doing $180 work per week. Splendid opportunity. L. Dieterich, 75 S. Hohman St., Hammond, Ind.

PATENTS OBTAINED—New book on patents free, 425 Popular Mechanics.

FOR SALE.

FOR SALE—Greenhouse (8,000 feet of glass), good boiler and chimney, dwelling and stable, Evanston, Ill., two blocks from C. & N. W. station. Good established trade direct from greenhouse. Price, ground, 150x175 feet, $4,000; dwelling and stable, $500; greenhouse, $500; total, $5,000. Terms, $2,000 cash; balance on time. Address 1127 Church Street, Evanston, Ill.

A CHEAP 80 ACRE farm 8 miles from Monona, Iowa. Good buildings, orchard; good land; only $1,800. Write for description if interested. Ask for our list of farm lands. Parker-Milne Co., 909 Guaranty Bldg., Minneapolis, Minn.

DERRICK GEARING for sale, cheap. Complete iron frame, double geared, light and heavy hoist. Inside and outside purchase; capacity, twelve tons. For sale at a bargain. Thomas & Miller, Quincy, Mass.

WAGON—Large two-horse bakers' delivery wagon, almost good as new. Beaver Valley Bakery, Beaver Falls, Pa.

ILLINOIS elevator at sacrifice or exchange for real estate; must be sold. W. L. Cadle, 440 Canal St., Chicago.

FOR SALE—Three-story brick house, on one of Chicago's finest residence streets of South Side; lot 35 x 125 feet; transportation facilities excellent. Will sell at a bargain. Address 600 Popular Mechanics.

FOR SALE—Telephones; give perfect satisfaction; magneto call; solid back transmitter; watch-case receiver. Best on the market for the money; will talk three miles. Only $4.00 each. For sale by 503 Popular Mechanics.

WIRE FOR SALE—The City of Austin, Tex., has for sale a quantity of line wire, in good condition. Nos. 6, 4, 1, 0, W. P. and No. 12 iron. For particulars address F. H. Bruce, Supt., Austin, Tex.

FOR SALE—1902 Model bicycle—never been used; all the latest improvements and equipment. Price $20.00—just one-half original cost. Address 508 Popular Mechanics.

FOR SALE—Telegraph instrument; giant sounder and key; wound to 20 ohms; never used. Price complete $4.30. Address 502 Popular Mechanics.

SQUAB BREEDERS, extra choice, large, selected Homers and crosses; matured mated breeders $1.00 per pair. Safe arrival anywhere and satisfaction guaranteed. Pigeon book complete; illustrating, describing all varieties and their care 5 cents. W. A. Bartlett, Box 45, Jacksonville, Ill.

A BARGAIN in Yellow Pine. We offer for sale 25,000 acres of Long Leaf Yellow Pine Timber Lands, located in Central Florida. Never been turpentined or cut on. Will cut 100,000,000 feet. Price $3.25 per acre. Brobston, Fending & Co., Brunswick, Ga.

FOR SALE—82½ acres, 3 miles from town, 50 in cultivation, balance pasture, good improvements; price $22 per acre, half cash; will trade for school land in Northwest Texas. Tom Landrum, Killeen, Tex.

FOR SALE—Exceptional opportunity to buy a $50.00 open top Cypress water tank, 2¼ in. staves, in use but six months, at less than half price; $19.00 f. o. b. Address for particulars, Coolidge Bros., South Sudbury, Mass.

FOR SALE or trade, a $35,000 tract of land, 1,610 acres, good soil. Want merchandise. Will consider other property. Terms to suit. Write for map and description. Describe what you have in first letter. A rare chance. Box 82, Wetaug, Ill.

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WILL SELL OR LEASE on royalty British and Canadian patents on household article of great merit. It is practically a monopoly in its line and large sales and profits will result if properly handled. Correspondence with reliable parties having not less than $5,000 solicited. Address No. 505, Popular Mechanics.

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WANTED. The Name and Address of Everybody Interested in Motor Dynamo, Telephone and Storage Battery Building, who will receive Catalogue Free. Chas. M. Turnpuist, Sells all kinds of Electrical Goods 442 W. Van Buren St. Chicago, Ill., WRITE TO DAY.

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WANTED—At once, a No. 1 tinner and cornice worker; good at all kinds of jobbing and one that can do a job of slating. Must be sober; steady job to the right man. James Rostron, Sidney, Ohio.

WANTED—First-class operator on shirt machine. Also marker and assorter. Good wages and permanent positions to right parties. Address, Ineeda Laundry, Beaumont, Texas.

TINNER WANTED—At once; young, single man, good on roofing, spouting and job work; fair knowledge of furnace work; must be sober and steady; steady job to right party. Albert Lehmann, 2593 Union St., Chicago, Ill.

WANTED—A COMPETENT Oil Mill Superintendent. Give references and particulars. Address Justin Matthews, Little Rock, Ark.

PLUMBER, FIRST-CLASS, accustomed to wind mill work preferred; steady work to the right man; references. B. F. Rockhill, Columbus, N. J.

WANTED—Assistant or working foreman, must have experience in propagating bedding plants. State wages expected with board. L. Mosbaek, near 85th street and South Chicago Avenue, Chicago, Ill.

WANTED—Sober and experienced man for stove and furnace repair work. Permanent job for a good one. E. L. Sommers, 7105 S. Chicago avenue, Chicago. Take Oakwoods and 71st St. cable on Wabash avenue.

POSITIONS WANTED.

WANTED, SITUATION—As head sawyer; southwest preferred. Good reference as to ability and habits. Can go on two days' notice. B. Gwin, Shoals, Ind.

YOUNG MEN who want to embark in business will find a valuable medium in Popular Mechanics Want Columns.

AUTOMOBILES.

FOR SALE CHEAP—Steam runabout, 414 Jackson St., Sioux City, Ia.

FOR SALE—One Dos-a-dos made by Mobile Co. of America, Tarrytown, N. Y. Run only a few months, with following new improvements: Automatic cylinder oil pump, two automatic boiler feed pumps, steam injector, forced draft, latest pattern Kelly generator, new burner, new chain and sprocket, "two quart" brass cylinder oil tank. Well cared for. In first-class condition. Price, $600. Selling to buy touring car. Peter G. Thomson, College Hill, Ohio.

$450 LOCOMOBILE runabout in good repair. Address 450 Popular Mechanics.

AUTOMOBILES—New and second hand, best bargains, 424 Popular Mechanics.

FOR SALE—One Century steam automobile, a bargain at $700, but if taken at once will take $450 cash. Elegant wagon, top, side lamps, large tank for gasoline; 14 gallons. First-class condition. Inspection and trial invited. Photo supplied on request, sending 2c. stamp. E. F. Macaulay, Ticonderoga, N. Y.

FOR SALE—New gasoline double-seated surrey, or touring car, equipped with a motor De Luxe, four cylinder engine. Very powerful. Geo. S. Proud, Mechanicsburg, Pa.

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CHARTERS.

"THIS BEATS NEW JERSEY"—Charters procured under South Dakota laws for a few dollars; write for corporation laws, blanks, by-laws and forms, to Philip Lawrence, late assistant secretary of state, Huron, Beadle Co., South Dakota.